Appendix D. Data Sets Used for the Lake Roosevelt Portion of the TMDL

Spokane Tribe Data

Locations	Fifteen stations in Lake Roosevelt
Timeframe	May 2001 through 2002
Sample Type	Grab samples from boat that was allowed to drift or held steady in the wind to keep thehydrolab cable vertical.
Frequency	Every 2 weeks to 1 month, less or not at all in winter
Equipment	Hydrolab Surveyor 4a and DataSonde 4
Frquency of Calibration and Maintenance	Prior to the first day of each sampling round: every 2 weeks from May-October 2001 and monthly from May through October 2002.
Calibration for BP procedure	Hydrolab was calibrated to barometric pressure from Fairchild Airforce Base
Calibration for TGP procedure	Hydrolab was calibrated to barometric pressure from Fairchild Airforce Base and 200 mm Hg plus barometric pressure from Fairchild AFB, corrected pressure generated by a digimon gage
Quality Control of Data	Electronic and manual data records checked against each other; data compared to readings from the US Bureau of Reclamation stations data from the International Border and Grand Coulee Forebay
Data Recording	Electronically and manually
Depth of Measurements	Every 3 meters from 0 to 33 meters depth.
Period of Equilibration	At least 90 seconds at each depth sampled; prior to commencement of sampling *(at each site or at the beginning of the day?)* hydrolab was allowed to equilibrate for 15 minutes in the reservoir.
Frequency of Data Download	
Service/Maintenance Records	
Maintenance Procedures	
Data Download Procedure	
Cross-sectional Representation	N/A

Columbia River Integrated Environmental Monitoring Program Data - Kootenai 1999

Locations	3 longterm stations (Brilliant Dam forebay and tail race and Corra Linn forebay); 5 short-term stations (Slocan Pool, Slocan Confluence, Kootenai Canal tail race, South Slocan forebay and Lower Bonnington Forebay); 9 grab sample locations
Timeframe	1999
Sample Type	At long term monitoring stations, equipment was housed in metal cabinets, Brilliant tail race station is installed in a standpipe founded in bedrock,
Frequency	10 minutes
Equipment	2 - Common Sensing TBO-F units with external Onset DL3 data loggers, 3 - Common Sensing TBO-F(DL) units with internal Onset DL3 data loggers, 3 - Common Sensing/Point Four Systems TBO-DL units, one Hydrolab Minisonde and one Novatek portable meter
Frequency of Calibration and Maintenance	Every 2 weeks at longterm stations, maintenance between deployment for other instruments
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	
Data Recording	Electronic at the long term and short term stations.
Depth of Measurements	3-4 meters
Period of Equilibration	20 minutes
Frequency of Data Download	Every 2 weeks at longterm stations, maintenance between deployment for other instruments
Service/Maintenance Records	
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	Data downloaded to portable computer at time of field servicing for longterm stations and at time of removal for short term stations.

Cross-sectional Representation	Prior to study a survey was performed in March 1999. A combination of visual assessments of flow and spot TGP measurements were used to determine representative monitoring sites. Measurements were taken at three points in a cross-section of the river to verify consistency of readings at Corra Linn Forebay and Brilliant Dam tail race.

Columbia River Integrated Environmental Monitoring Program Data - HKL, ROB 1999

Locations	2 sites on the Columbia Hugh Keenleyside Dam Forebay and Robson Station, 5km downsteam of dam on left bank
Timeframe	1999
Sample Type	Monitoring stations
Frequency	10 minute at the forebay station from 2/17-3/17 and at Robson station and hourly at the forebay station for the rest of the year
Equipment	Common Sensing TBO-F(HLKFB); Campbell Scientific data logger (ROB);
Frequency of Calibration and Maintenance	Every 2 weeks from April-November; As water temperature and daylight decreased from September to November, station calibration frequency was reduced to once a month due to decreased algal growth and reduced risk of condensation within the membrane.
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	
Data Recording	Electronic
Depth of Measurements	3-4 meters
Period of Equilibration	20 minutes
Frequency of Data Download	Daily
Service/Maintenance Records	
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	Remote download
Cross-sectional Representation	

Teck-Cominco

Locations	Waneta Dam Forebay
Timeframe	1999
Sample Type	Monitoring stations
Frequency	10 minute intervals
Equipment	
Frequency of Calibration and Maintenance	
Calibration Procedure for Barometric Pressure	
Calibration Procedure for TGP	
Quality Control of Data	
Data Recording	
Depth of Measurements	
Period of Equilibration	
Frequency of Data Download	
Service/Maintenance Records	
Maintenance Procedure	
Data Download Procedure	

Cross-sectional Representation

BC Hydro Data

Locations	Seven Mile Dam Tail Race and Forebay, Salmo River, Waneta Dam
Timeframe	1995-1998
Sample Type	Monitoring stations
Frequency	Hourly in 1995; 5 or 10 minute intervals in 1996-1998
Equipment	
Frequency of Calibration and Maintenance	
Calibration Procedure for Barometric Pressure	
Calibration Procedure for TGP	
Quality Control of Data	
Data Recording	
Depth of Measurements	
Period of Equilibration	
Frequency of Data Download	
Service/Maintenance Record	
Maintenance Procedure	
Data Download Procedure	

Cross-sectional Representation

US Bureau of Reclamation FMS **Data Quality Report**

Locations	International Border, Grand Coulee Dam Forebay and Tail Race
Timeframe	1995-first quarter 2003
Sample Type	Fixed monitoring stations (FMS)
Data Resolution	Hourly (From DART site)
Equipment	Common Sensing TBO-L TDG probe and display, interfaced to a Sutron Series 8200 DCP, with battery backup and AC continuitiy reporting.
Frequency of Calibration and Maintenance	Every other week during spill season; monthly during off-season
Calibration Procedure for BP	Primary field sensor calibrated to a NIST-certified mercury barometer sensor (in lab), to a secondary standardized barometer during FMS calibration.
Calibration for TGP procedure	Probe readings compared to NIST tested Hydrolab in field before and after being pulled; if readings vary by more than 2 mm Hg meter is closely checked for source of disfunction or replaced; Annual servicing in laboratory in cludes calibration of TGP meter at two pressures.
Quality Control of Data	Not done
Data Recording	Electronic
Depth of Measurements	International Boundary and Grand Coulee tailrace sites are 8-20' (variable with stage height); Grand Coulee Dam forebay station fixed at elevation 1193 feet Sept. 1997. Grand Coulee Forebay site is currently operated with a fixed depth of 30' from surface.
Period of Equilibration	Generally, for periods upto 1.5 hrs (representing 95% of expected equilibration value) or until readings do not change significantly with time when compared against a calibrated secondary standard.
Frequency of Data Download/Broadcast	Data polling of TDG probe at each FMS by Sutron DCP every 15 minutes; Data is broadcast every 4 hours.
Service/Maintenance Records	None compiled in past by USBR. Reported to USACE annually at end of spill season. Complied monthly or bi-weekly from 01/03 to present by CBE, under current contract to USBR.
Maintenance Procedure	Clean; replace mebrane; check TDG membrane for operability during field servicing. Pre- and post-deployment calibration checks for TDG, temperature, and barometric sensors against primary or secondary standards.
Data Download Procedure	The most current data are transmitted in a binary format to the GOES satellite. The data is received by the USBR Direct Readout Ground Station in Boise and stored in the Hydromet "DAYFILES" database and daily summary data are stored in the "ARCHIVES" database. USACE uses their own GOES receiving systems to collect and process the data indepentantly.
Cross-sectional Representation	Study was done at three sites in the late 1990's by USBRs Regional lab. Vertical profile measurements were taken at several CSA sites with a Hydrolab Sonde. The agency concluded that TDG measurements at three extant FMS on Columbia River were consistent with cross-sectional / vertical profile measurements.

Avista Data

Locations	Little Falls Dam Tail Race on the Spokane River (located at the confluence of the spillway channel and the turbine tail race approx. RM 29.5)
Timeframe	1999-2002
Sample Type	Monitoring stations
Frequency	Hourly
Equipment	Common Sensing DL-3 with 100 ft. cable
Frequency of Calibration and Maintenance	1-2 weeks during spring, summer & fall; 3-4 weeks during the winter
Calibration Procedure for BP	Barometric pressure compared to a portable barometric pressure unit (TBO-L Common Sensing). Adjustments were made if measurements had a greater than 2% variability
Calibration Procedure for TGP	TGP was compared to a portable barometric pressure unit (TBO-L Common Sensing). Adjustments were made if measurements had a greater than 2% variability
Quality Control of Data	Data judged based on service record and examination of the data. Data collected when there was a power loss, water level dropped below the probe, after there was a greater than 15% change in 4 hours, or if there was a greater than 5% variability discovered during calibration was discarded.
Data Recording	Electronic
Depth of Measurements	8-15 feet during normal high water
Period of Equilibration	15 minutes
Frequency of Data Download	1-2 weeks during spring, summer & fall; 3-4 weeks during the winter
Service Record	Written at time of servicing; available
Maintenance Procedure	Real time readings documented, then probe was removed from water and inspected, washed in water and dried; probe was then calibrated in air per manufacturers instructions; after re-installation the probe readings are monitored until equilibirium and clibration is re-checked. If probe could not be calibrated or required repair it was replaced with a back up and taken to the lab.
Data Download Procedure	Downloaded on site to a portable computer.
Cross-sectional Representation	

Seattle Power and Light Data

Locations	Boundary Dam Reservoir and Pend Oreille River at International Boundary 0.9 mi downstream of Boundary Dam
Timeframe	1999
Sample Type	Monitoring station
Frequency	Hourly
Equipment	Hydrolab MiniSonde for TGP and Sutron 8200
Frequency of Calibration and Maintenance	3-4 weeks
Calibration Procedure for BP	None
Calibration Procedure for TGP	Replacement probes calibrated in lab prior to being taken to the field; check at 3 pressures: 2#, 4# and 6#; Check in place probes' readings against calibrated probes in field, use a linear adjustment to correct data for any variance.
Quality Control of Data	Data is corrected for any variance in readings between the calibrated probe and the in-place probe; Correction is distributed linearly in time through the data from the last calibration period.
Data Recording	Electronic
Depth of Measurements	15 feet, desired depth, reservoir is on a float always at 15 feet; downstream is on a 75# weight and is sometimes lower than 15 feet due to fluctuations in the water level
Period of Equilibration	5-30 minutes whenever readings become stable
Frequency of Data Download	Satellite transmission
Service/Maintenance Record	Yes, kept by USGS, who installed and maintain station
Maintenance Procedure	Probes are replaced; Remove probe to laboratory; clean and dry membrane; re-calibrate prior to installation.
Data Download Procedure	Satellite transmission to USGS
Cross-sectional Representation	Run cross-sections consisting of 10 horizontal with 2-3 vertical points (at 2/10, 8/10 and sometimes 6/10 depth of stream) at high flow once a year; In addition a private firm unrelated to the ongoing monitoring did study over 10 day period to verify that the chosen monitoring locations provided representative cross-sectional values.